

Snap-on®

VERSATORQ1 SYSTEM

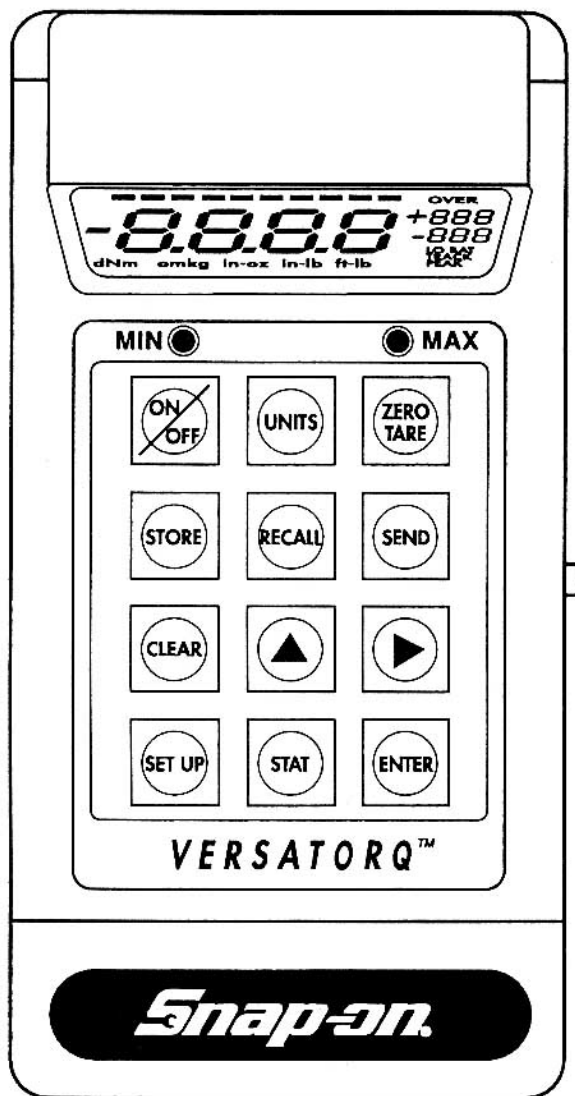


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2801-80th Street
Kenosha, WI 53141-1410, U.S.A.

Snap-on. VERSATORQ1

VERSATORQ System

IMPORTANT SAFETY INSTRUCTIONS

▲ WARNING

Risk of fire, electronic shock, entanglement and flying particles.

- Wear safety goggles, user and bystanders.
- Read this manual completely before using the VERSATORQ System.
- Be sure all components, including all sensors, adaptors, extensions, drivers and sockets are rated to match or exceed the torque being applied.
- Observe all equipment, system and manufacturer's warnings, cautions and procedures when using this meter.
- Do not use this meter with power off. Always turn on the meter so the torque values are indicated on the display.
- Use preset alarm circuitry to protect fasteners and sensors from overload.
- Do not press ZERO TARE while torque is applied.
- To avoid damaging sensors:
 - Do not exceed maximum sensor capacity when breaking fasteners loose.
 - Verify the calibration of any sensor whose capacity you know or suspect has been exceeded. (Display shows sensor OVER load when sensor capacity is exceeded.)
 - Check that the sensor's capacity matches or exceeds each application before proceeding.
 - For personal safety and to avoid sensor damage, follow good, professional tool practices when using drivers with sensors.
- Use the correct size socket for the fastener.
- Do not use sockets showing wear or cracks.
- Replace fasteners with rounded corners.
- Always pull—do not push—on a wrench handle, and adjust your stance to prevent a possible fall should something give. Do not use extensions, such as a pipe, on the handle of a wrench.
- When using ratchets, make sure the direction lever is fully engaged in the correct position.

Charger

WARNING

Risk of fire, electric shock and flying particles.

- 120 or 220 volts present at charger terminals. Do not probe with conductive objects.
- For indoor use only. Do not expose charger to rain or snow. Do not use in damp locations.
- Replace defective cord immediately. Return to a qualified service center for replacement.
- Use *Snap-on* VERSACHARGERS only with supplied battery pack. Charging any other type battery may cause the battery to burst, resulting in personal injury or equipment damage.
- Disconnect charger by pulling plug rather than cord.
- Be sure cord is located so that it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- An extension cord should not be used unless absolutely necessary. Use only the recommended gauge and length cord.
- Use of improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure that:
 - Pins on plug of extension cord are the same number, size, and shape as those of the charger;
 - Extension cord is properly wired and in good electrical condition; and,
 - Wire size is large enough for AC ampere rating of charger as specified in manufacturer's instructions.
- Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; return it to an authorized service center.
- Do not disassemble charger; return it to an authorized service center when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
- To reduce risk of electric shock, unplug charger from outlet before attempting any cleaning.
- Never attempt to connect two (2) chargers together.
- The charger is designed to operate on standard household electrical power (120 or 220 volts). Do not attempt to use on any other voltage.

Fire, electric shock, flying particles and misuse can cause injury.

SAVE THESE INSTRUCTIONS

Introduction

The VERSATORQ1 Portable Electronic Torque Meter displays torque readings from sensors that attach between the socket and driver. The VERSATORQ System is a highly versatile torque metering, data acquisition system that can be used with sockets, extensions, universal joints, ratcheting drivers and any combination of these. Sensors, purchased separately, are available in 8 ranges from 2–20 in-oz, to 150–1500 ft-lb, and provide readings with an accuracy of better than 1 percent (2% for 2–20 in-oz and 1–10 in-lb sensors).

Display

The meter features a wide angle viewing LCD display with selectable readouts in ft-lb, in-lb, in-oz, Nm, dNm, mKg and cmKg units, depending on the sensor being used.

Settings

Enter meter settings on the push-button membrane keypad. High and low torque limits are adjustable to give an audible and visual alarm. Select TRACK mode to display torque values as applied, or PEAK mode to display the highest torque value applied. Set the ZERO TARE function automatically or manually.

Information Storage and Output

The meter stores and recalls up to 3500 readings and provides Statistical Process Control (SPC) analysis output. Both RS-232 and *Mitutoyo* serial communication are available for printer and computer interfacing.

Power Source

The meter operates from an internal rechargeable NiCad battery or directly from a battery charger powered by the AC line. Sensor "idle" and display "sleep" modes conserve battery power.



The meter is shipped with a low battery charge. The battery should be brought up to full charge (over night) before the meter is used.

Torque Limits

Torque limits are indicated on dual LED and audible indicators. An audio output jack permits the use of head phones in a noisy environment. A belt clip on the back of the meter leaves both hands free for work.

Calibration

The meter and the optional sensors can be calibrated by the user with a known torque input. A special memory chip, built into the sensor, identifies the sensor's range and calibration parameters to any VERSATORQ1 meter.



The information in this manual is general. **Snap-on** Tools Company makes no claims as to the suitability of this information for diverse user applications.

Specifications

Meter

Display

4-digit LCD with alpha and numeric function flags

Display Capacity*

±4 digits, 8,000 counts

Accuracy

±1 % of reading (10 to 100% of sensor range) (±2% with VERSA1S20 and VERSA1S10 sensors)

Push Button Key Pad

- Hi/Lo Alarm
- ZERO TARE
- SET UP
- UNITS
- STORE
- RECALL
- CLEAR
- SEND
- STATISTICS
- ENTER

Units of Measurement

ft-lb, in-lb, in-oz, Nm, dNm, mkg and cmkg

Operating Temperature

5–42°C (40–110°F)

Storage

-20–50°C (-2–122°F)

Humidity

Up to 90%, non-condensing

Dimensions

3" wide
2.5" high (3" with belt clip)
6" deep

Weight

1 lb

Charge Life (full charge to shutoff)

20 hours, continuous

Battery Charger Input

120 VAC or 220 VAC (50–60Hz)

Battery Charger Output

9 VDC, 200 mA.

Data Storage/Recall

3,500 measurements

Serial Output Port

RS-232 (true), 300–19.2K baud, and *Mitutoyo* (Statistical Protocol)

- **Statistical Analysis**

- Max, Min, Range, Mean, Sigma N, Sigma, Cp, Cpk, %Error, -NoGo, +NoGo

- **Histogram**

- Lower set limit, upper set limit, 10 divisions



*VERSATORQ1 display ignores torque inputs less than 0.5% of full scale in TRACK mode and 2.0% of full scale in PEAK mode.

Sensors

VERSATORQ1 smart sensors provide industry standard square drives. They feature a full bridge strain-gage at 350 ohms nominal.

Sensors use a built-in EEPROM memory chip that stores sensor identification and calibration factors. All system components (meters and sensors) are factory calibrated and are interchangeable.

User calibration of sensors is possible given a known input torque and the VERSATORQ1 METER SET UP function. For additional information refer to *Calibration*. Sensors can withstand an overload of 150% of full range. The VERSATORQ1 meter will alarm, (audible beep and display "OVER" flag) at 110% of rated capacity.

Sensor Ranges and (Resolutions) in different units of torque measurement
[UNITS]

Part No	Range	ft-lb	in-lb	in-oz	Nm	dNm	mkg	cmkg
VERSAIS20	2-20 in-oz	.010-.104 (.001)	0.125-1.250 (.001)	2.00-20.00 (.02)	.014-.140 (.001)	.140-1.410 (.001)	.001-.014 (.001)	0.140-1.440 (.001)
VERSAIS10	1-10 in-lb	.083-.830 (.001)	1.00-10.00 (.01)	16.0-160.0 (.1)	.113-1.130 (.001)	1.13-11.30 (.01)	.015-.115 (.001)	1.15-11.50 (.01)
VERSAIS50	5-50 in-lb	.416-4.167 (.002)	5.00-50.00 (.02)	80.0-800.0 (.4)	.565-5.650 (.002)	5.65-56.50 (.02)	.057-.575 (.002)	5.76-57.60 (.02)
VERSALS200	20-200 in-lb	1.67-16.67 (.01)	20-200 (.1)	320-3200 (1)	2.26-22.60 (.01)	22.6-226.0 (.1)	0.230-2.300 (.001)	23.0-230.0 (.1)
VERSA2S100	10-100 ft-lb	10.0-100.0 (.1)	120-1200 (1)		13.5-135.5 (.1)	135-1355 (1)	1.38-13.83 (.01)	138-1383 (1)
VERSA3S250	25-250 ft-lb	25.0-250.0 (.1)	300-3000 (2)		34.0-340.0 (.2)	340-3400 (2)	3.45-34.55 (.02)	345-3450 (2)
VERSA4S600	60-600 ft-lb	60.0-600.0 (.2)	720-7200 (3)		81.3-813.5 (.4)	813-8135 (4)	8.30-83.00 (.04)	830-8300 (4)
VERSA5S1500	150-1500 ft-lb	150-1500 (1)			203-2035 (1)		20.7-207.5 (.1)	

Sensor Range	Part No.	Drive	Diam.	Length	Cable
2-20 in-oz*	VERSA1S20	1/4"	0.5"	2.9"	48"
1-10 in-lb*	VERSA1S10	1/4"	0.7"	2.9"	48"
5-50 in-lb	VERSA1S50	1/4"	0.9"	2.1"	48"
20-200 in-lb	VERSA1S200	1/4"	0.9"	2.1"	48"
10-100 ft-lb	VERSA2S100	3/8"	1.2"	2.4"	48"
25-250 ft-lb	VERSA3S250	1/2"	1.4"	2.6"	48"
60-600 ft-lb	VERSA4S600	3/4"	2.0"	3.9"	96"
150-1500 ft-lb	VERSA5S1500	1"	2.4"***	4.4"	92"***

* Knurled handle for fingertip control.

** Diameter does not include side mounted connector.

*** Heavy duty coiled cord with 4-pin MS style sensor connector.

Functional Description

Display

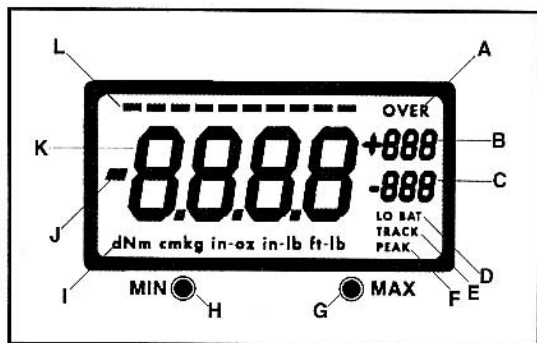


Figure 1: VERSATORQ Display

- A – Over Torque Warning
- B – Number of Present Reading Recalled from Memory
- C – Total Number of Readings Stored in Memory
- D – Low Battery Indicator
- E – Track Mode Active
- F – Peak-Hold Mode Active
- G – MAX LED
- H – MIN LED
- I – Torque Conversion Units
- J – Minus sign Signifies Counter Clockwise Torque
- K – 4-Digit, 0.5" LCD Display, 8000 Counts Resolution
- L – Analog Bar Graph Left to Right CW Torque Right to Left CCW Torque

The four-digit, .5", wide angle LCD display shows applied torque in TRACK mode or the highest torque value captured in PEAK (peak-hold) mode. This display is also used for SET UP programming and to indicate functional and fault conditions.

Display flags include: dNm, Nm, cmkg, mkg, in-oz, in-lb, and ft-lb units of measure, OVER torque alarm, LO BATT battery monitor, real time torque TRACK and captured PEAK modes.

A small, three-digit display indicates the number of the present reading recalled from memory. Below it, another three-digit display shows the total number of readings stored in memory*. In the SET UP mode, these displays indicate the UPPER (+) and LOWER (-) percentage values for ALARM preset, respectively.



*Both three-digit displays roll through 999 three times to accommodate up to 3500 readings. The printout displays up to four digits.

A ten segment analog bar graph, scaled to the ALARM preset value, provides a live indication of applied torque. The graph moves left to right for CW and right to left for CCW torque applications.

A green LED indicates that at least the minimum preset torque is presently applied, and a red LED indicates maximum preset torque is presently exceeded.

Keypad

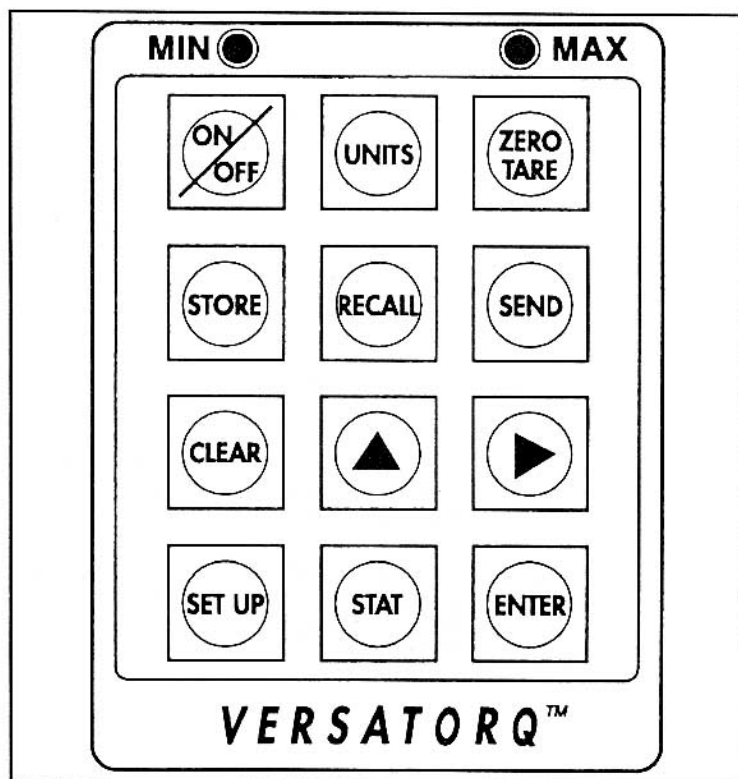


Figure 2: Keypad



Powers ON/OFF to and from sleep mode. Battery Saver Switch on side of unit. Refer to *Figure 3*.



Selects unit of measurement: ft-lb, in-lb, in-oz, Nm, dNm mkg and cmkg.



Manual ZERO TARE. Also momentarily displays present sensor range and preset limits. (Automatic ZERO TARE at power on, from sleep mode and at sensor change.)



Stores present torque reading in memory and clears PEAK display.



Recalls last torque reading from memory. Push ENTER to exit RECALL mode.



Sends data to serial port for communication with RS-232 printer or *Mitutoyo* statistical printer. (Must be in RECALL mode to SEND.)



Clears PEAK reading from display. Clears present reading in RECALL mode. To clear entire memory, push RECALL, then hold CLEAR key for three seconds.



Scrolls up to increase numeric values and selects TRACK or PEAK mode during SET UP programming. Increments reading location in RECALL mode.



Shifts to next blinking digit or function flag during SET UP programming. Decrements reading location in RECALL mode.



Opens programming for preset limits, printer port, and calibration.



Sends all memory data, statistical analysis and histogram to the serial port in RS-232 protocol.



Enters program parameters during SET UP programming. Also used to exit RECALL mode.

Input/Output

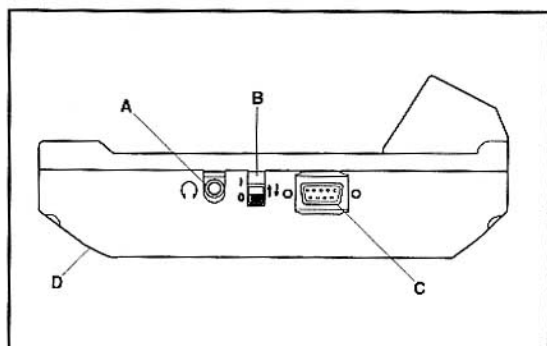


Figure 3: Input/Output—Right Side View

A — Earphone Jack

1/8" diameter stereo tip jack, provides two distinctive tones; a low tone at MIN preset torque input and a high tone at or above MAX torque input (Does not disable the Alarm sounder when in use.)

B — Battery Saver Power Switch

Disconnects the rechargeable battery from the VERSATORQ1 circuit. At power-on, unit comes to life, self-checks and returns to last SET UP parameters, unless the sensor has been changed.

C — Serial Port

Accepts DE9S subminiature 9-pin female connector. This is a true RS-232 communication port, configurable to computer and serial printer downloading of data list or statistical analysis with histogram. It is also configurable to *Mitutoyo* statistical printer protocol.

D — Alarm Sounder

Produces a distinctive 2KHz continuous tone at MIN preset torque input and a pulsating tone at or above MAX torque input. Also sounds momentarily for each key pad entry.

Internal Memory Backup Battery (not shown)

Powers memory to retain set up and data for up to ten years.

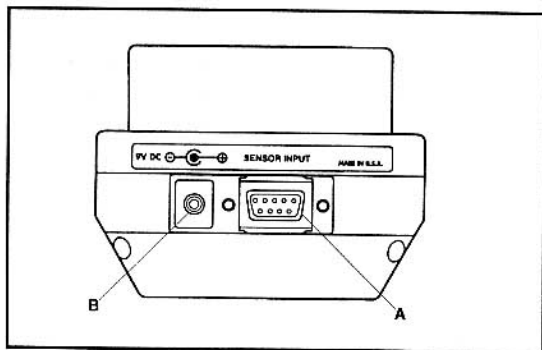


Figure 4: Input/Output—Top View

A — Sensor Input

Accepts DE9P subminiature 9-pin male connector. Sensors feature full bridge, 350 ohm, strain gages and built-in EEPROM memory chip for range identification and calibration. Sensor excitation is 6.0 volts DC. Strain gages are sampled three times/second in idle mode and 77 times/second when input exceeds 1% of sensor range.

B — Charger Jack

Accepts 9V DC, 200 mA charger that may also be used on the bench as power supply from the AC line. (Center contact is positive.)

SET UP

Measurement Modes

When delivered, the VERSATORQ1 meter is programmed to read torque in the TRACK mode. The preset limit is set to the installed sensor's full scale range. The MIN and MAX percentages are zero. If the meter has been used before, it will return to the last SET UP program, including the torque data stored in memory, unless a different sensor is installed.

At power ON, the meter does a display check and self-test. It automatically identifies the installed sensor and sets its rated UNITS for display. The sensor's full scale range is displayed for two seconds, then preset torque, upper limit percent and lower limit percent are displayed for two seconds. (With no sensor present the meter sounds a pulsating alarm and the display scrolls "no SEnSor.")

At power ON, or when changing sensors, the meter automatically sets ZERO TARE. It is important that no torque is applied to the sensor during start-up.

Use SET UP to:

- Set preset torque;
Set MAX torque as a percentage over preset torque;
- Set MIN torque as a percentage under preset torque;
and,
- Select TRACK or PEAK modes.

Procedure

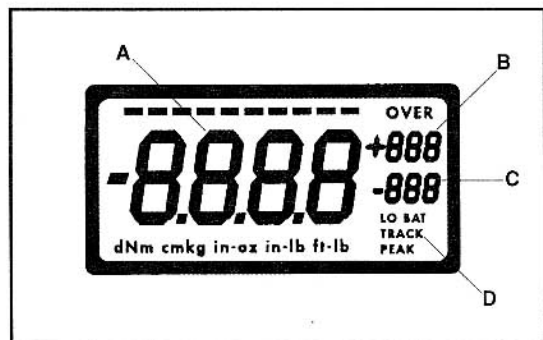


Figure 5: SET UP Display

- A - Torque Preset Digits
- B - MAX Torque Percent Over Preset
- C - MIN Torque Percent Under Preset
- D - TRACK/PEAK Flags

1. Push SET UP. The most significant digit (MSD) on the large numeric display blinks on and off.
— Push UNITS to change torque unit of measurement.
2. Push the μ key to increment the MSD of the desired preset torque value. Be sure to consider decimal point location.
3. Push the ψ key to shift to the next significant digit.
4. Repeat steps two and three for the last two-digits. The 10's digit on the small upper numeric display then blinks on and off.
5. Push the μ key to increment the 10's digit to set the desired MAX torque alarm as a percentage over the preset torque.

6. Push the Ψ key to shift to the I's digit.
7. Repeat steps five and six. The 10's digit on the small, lower numeric display blinks on and off.
8. Push the μ key to increment the 10's digit to set the MIN torque alarm as a percentage under the preset torque.
9. Push the Ψ key to shift to the I's digit.
10. Repeat steps 8 and 9. The TRACK flag or PEAK flag blinks on and off.
11. Push the μ key to toggle between TRACK and PEAK flags.
12. Push ENTER to accept the SET UP program and return to torque measurement mode. (ENTER may be pushed any time during SET UP.)

Printer Modes

When delivered, the VERSATORQ1 meter is programmed to communicate with an RS-232 serial printer or computer COM port. All data in memory, statistical analysis and a histogram (including MAX and MIN preset limits) are printed using the STAT key. The serial port can also be programmed to download the data list or simply "dump" the stored torque values from memory using the RECALL-SEND keys. This is particularly handy for users wishing to crunch the data in a spreadsheet or database using a computer.

Serial Protocol:

- RS232 true 8 Data bits, 1 Stop bit, No Parity.

Alternatively, the meter can be programmed to communicate with a **Mitutoyo** statistical printer. This printer provides the same data list, statistical analysis and histogram.

At power ON, the meter recalls the last SET UP program.

Use SET UP to:

- Select printer mode;
- Set baud rates for printers; and,
- Set carriage return and character delays.

Procedure

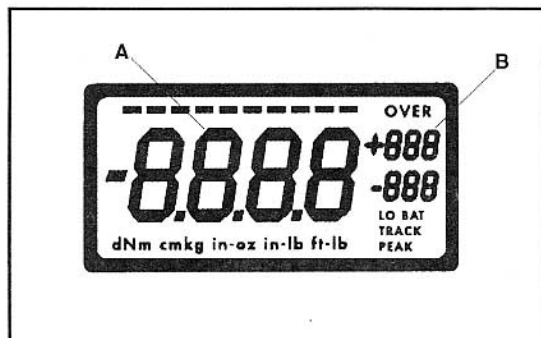


Figure 6: Printer Mode Display

- A – Program Codes, Baud Rate Codes, Delay
mSEC
B – Program Address Indicator

1. Push SET UP key and hold for three seconds. The display momentarily reads "COdE," the most significant digit (MSD) and the large numeric display blink on and off.
2. Using the μ key to increment digits and the ψ key to shift to the next digit, program the number "2000" into the display.
3. Push the ENTER key. The small upper numeric display reads "P9" indicating printer select address code.
4. Using the μ key to increment digits and the ψ key to shift to the next digit, program the selected printer mode code:
 - "0001"=RS-232–Data List Download to Printer/Computer
 - "0002"=**Mitutoyo** Protocol
 - "0004"=RS-232–Torque Value Dump to Printer/Computer
5. Push the ENTER key. The small upper numeric display reads "P10" indicating baud rate select address code.

6. Using the μ key to increment digits and the ψ key to shift to the next digit, program the selected baud rate code:
 - "0012" = 1200 Baud
 - "0024" = 2400 Baud
 - "0048" = 4800 Baud
 - "0096" = 9600 Baud
 - "0192" = 19.2K Baud
7. Push the ENTER key. The small upper numeric display reads "P11 " indicating carriage return delay address code.
8. Using the μ key to increment digits and the ψ key to shift to the next digit, program carriage return delay in milliseconds (default = "0600").
9. Push the ENTER key. The small upper numeric display reads "P12" indicating character delay address code.
10. Using the μ key to increment digits and the ψ key to shift to the next digit, program character delay in milliseconds (default = "0014").
11. Push the ENTER key to accept and end printer SET UP.

Sleep Mode

When delivered, the VERSATORQ1 meter is programmed to automatically shut off when idle for five minutes. This feature helps to conserve battery charge.

Use SET UP to:

- Enable sleep mode, or
- Disable sleep mode.

Procedure

1. Push SET UP key and hold for 3 seconds. The display momentarily reads "COdE", the most significant digit (MSD) on the large numeric display blinks on and off.
2. Using the μ key to increment digits and the ψ key to shift to the next digit, program the number "1000" into the display.
3. Push the ENTER key.

4. Using the μ key to increment digits and the ψ key to shift to the next digit, program the mode code:
 - "0000" = Enable Sleep Mode" (Auto Shut Off)
 - "0001" = Disable Sleep Mode
5. Push ENTER key.

How to Measure Torque

⚠ CAUTION

- If the display ever indicates "OVER", discontinue torquing and verify the calibration of the sensor. For additional information refer to *Sensor Calibration*.
- Never push the ZERO TARE key with torque applied.
- For best accuracy, sockets should be attached directly to the sensor's external drive. If an extension is used, the extension should be installed between the sensor and the wrench-not between the sensor and the socket.

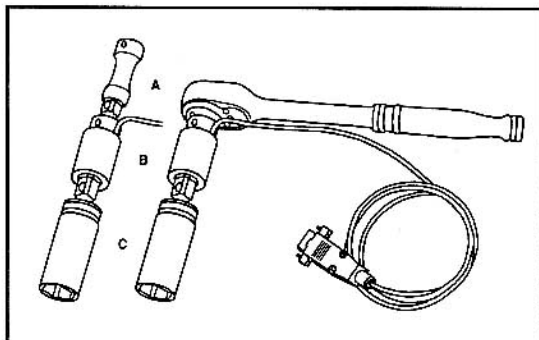


Figure 7: Sensor-Socket Relationship

- A - Extension
- B - Sensor
- C - Socket

IMPORTANT

For a correct driver-sensor-socket relationship sensors should always be next to the socket. If an extension were used, the extension would go between the sensor and the ratchet (driver), not between the sensor and the socket.

Track Mode

1. Select the desired torque sensor and connect it to the VERSATORQ1 meter.
2. Turn ON the meter using the power switch located on the right side. If the power switch is already ON, push the ON/OFF key to "wake" the meter from the "sleep" mode.
3. If the display indicates PEAK, change to TRACK mode. For additional information refer to *SET UP*.
4. Using the UNITS key, select the desired units of measurement.
5. Read applied torque in real time on the large, four-digit numeric display.
6. The meter sounds a continuous tone and the MIN (green) LED lights when torque input reaches the lower preset value (preset minus percent tolerance).
7. The meter sounds a pulsating tone and the MAX (red) LED lights when torque input reaches the upper preset value (preset plus percent tolerance). To change the preset value and MIN-MAX, (upper and lower percentage tolerances), refer to *SET UP*.

Peak Mode

1. Select the desired torque sensor and connect it to the VERSATORQ1 meter.
2. Turn ON the meter using the power switch located on the right side. If the power switch is already ON, push the ON/OFF key to "wake up" the meter from "sleep" mode.
3. If the display indicates TRACK mode, change to PEAK mode. For additional information refer to *SET UP*.
4. Using the UNITS key, select the desired units of measure.
5. Applied torque is captured and held on the large, four-digit numeric display. The reading increases if additional torque is applied.

6. The meter sounds a continuous tone and the MIN (green) LED lights when torque input reaches the lower preset value (preset minus percent tolerance.)
7. The meter sounds a pulsating tone and the MAX (red) LED lights when torque input reaches the upper preset value (preset plus percent tolerance.)
8. To clear the display push the CLEAR key.
 - To change the preset value and MIN-MAX, (upper and lower percentage tolerances), refer to *SET UP*.
 - The meter goes to "sleep" mode if idle for five minutes.

Store, Recall and Clear Readings in Memory

To store a reading in the TRACK mode, push the STORE key while torque is being applied. The number of each stored reading displays in the small upper numeric display. Zero readings are not stored.

To store a reading in the PEAK mode, push the STORE key *after* the torque reading is captured. The display automatically clears for the next reading. Zero readings are not stored.

To display previously stored readings, push the RECALL key. Repeatedly push RECALL to decrement from last reading to first, or hold the μ key to increment, or hold the ψ key to decrement the reading number. (The number of the displayed torque reading is indicated in the small upper numeric display). Push ENTER to exit RECALL mode.

In RECALL mode, push CLEAR to delete the displayed reading. The total number of readings are decremented by one (1). To clear the entire memory in RECALL mode, push the CLEAR key and hold for three seconds. Display reads "CLr" and the small upper display reads "ALL". Push ENTER to exit RECALL mode.

Downloading—Printer or Computer

For additional information refer to *SET UP—Printer Modes*.

Connect the RS-232 printer cable between the VERSATORQ1 meter serial port and the serial printer or computer COM port.



To generate a complete statistical report, both high and low (MIN and MAX), preset percentage levels must be programmed into the meter. Refer to *SET UP—Measurements Modes*.

Statistical Download to Printer

Push STAT key. Display momentarily indicates "CALC" and then "SEnd" during download to the printer.

Data List or Torque Value Download to Printer

1. Push RECALL key.
2. Push SEND key. Display indicates "SEnd" during download to printer.

Data List Download to Computer

1. Set up the computer to receive serial communication.
Example: Using an IBM compatible PC and Windows '95, open the Terminal program, click on START, click on RUN, and type TERMINAL, then press ENTER.
2. Push RECALL key.
3. Push SEND key. Display indicates "SEnd" during download to the computer.
Example: On the example computer, click on EDIT, SELECT ALL, COPY. Open the spreadsheet, click on EDIT, then PASTE.

Mitutoyo Printer Interface

1. On **Mitutoyo**, press CLEAR then TOL LIMIT keys.
2. On VERSATORQ1, push SET UP key then SEND key.
3. On **Mitutoyo**, press TOL LIMIT key again.
4. On VERSATORQ1, push ENTER key (to exit SET UP).
5. On VERSATORQ1, push RECALL key, then SEND key. Display indicates "SEnd" during download to the **Mitutoyo** printer.
6. On **Mitutoyo**, press STAT key. Printer generates statistical data list, analysis and histogram.

Calibration

The VERSATORQ System is calibrated at the factory using certified torque bars and weights. Sensors are positioned horizontally with the external drive facing the user and the detent ball to the left. Other torque calibration equipment that simulates your specific measurement applications may be preferred to insure maximum accuracy. Annual calibration is recommended.

IMPORTANT

Calibration by the user is recorded in the memory and voids factory certification. Contact your Snap-on sales representative for calibration and repair services.

Equipment Required

- Precision test bars and certified calibration weights, or another torque source, accurate to 1/4% of reading.
- Laboratory grade digital volt/millivolt meter. (FLUKE 45 Multimeter or equivalent recommended).
- Calibration fixture. Refer to *Figure 8*.

VERSATORQ Sensor		Calibration Bar		Calibration Weights	
Part Number	F.S. Range	Length	Weight	10% F.S.	70% F.S.
VERSA1S20	20 in oz	2.5 in	1.5 lb	0.8 oz	5.6 oz
VERSA1S10	10 in lb	2.5 in	1.5 lb	0.4 lb	2.8 lb
VERSA1S50	50 in lb	5.0 in	3.5 lb	1.0 lb	7.0 lb
VERSA1S200	200 in lb	5.0 in	3.5 lb	4.0 lb	28 lb
VERSA2S100	100 ft lb	20 in	12 lb	6.0 lb	42 lb
VERSA3S250	250 ft lb	20 in	12 lb	15 lb	105 lb
VERSA4S600	600 ft lb	40 in	57.5 lb	18 lb	126 lb
VERSA5S1500	1500 ft lb	40 in	57.5 lb	45 lb	315 lb

Factory Calibration—Certified Torque Bars and Weights

Quick Check

1. With the VERSATORQ1 meter in the TRACK mode, apply and remove the sensor's full scale torque three times in the clockwise (CW) direction. For additional information refer to *Track Mode*.
2. Remove the weights, leaving the bar attached, and push the ZERO TARE key.

3. Apply a known torque that is about 10% of sensor rating in the CW direction. Verify that the display reading is within $\pm 1\%$ of the applied torque. (2% for VERSA1S20 and VERSA1S10).
4. Apply about 70% of sensor rating and verify the reading is within $\pm 1\%$ (2% for VERSA1S20 and VERSA1S10).
5. Repeat steps 1-4 in the counter clockwise (CCW) direction. If any reading is out of specification proceed to *Sensor Calibration*.

Sensor Calibration

WARNING

Improper calibration will result in torque measurement errors. Follow these procedures precisely. If you make a mistake, turn the meter off and begin the calibration procedure again. Users are responsible for the results of their sensor calibration.

Procedure

1. Install the sensor being calibrated and turn on the VERSATORQ1 meter. Apply and remove the sensor's full-scale torque three times in the CW direction.
2. Push SET UP key and hold for three seconds.
3. Program calibration code "5222" into the display using the μ increment key and the ψ shift key.
4. Push ENTER key. The small upper display reads "CAL" and the lower display reads "FS."
5. Push UNITS key to match units on sensor label.
6. Program full scale value of sensor into the display using the μ increment key and the ψ shift key.
7. Push ENTER key. Display now reads "LoAd." The small upper display also reads "CAL."
8. Apply CW torque to the sensor until the VERSATORQ1 alarm sounds indicating sufficient input exercise.
9. Remove torque weights, leaving the torque arm attached. The display shows alternating "-00-" and "0-0."

10. Push ZERO TARE key. Display reads 10% of the sensor's rated capacity with MSD blinking. Small lower display reads "1."
11. Apply 10% of the sensor's rated capacity in CW torque.
12. Push ENTER key. The display reads between "0200"—"0450" during a count down sequence of 9 to 1 as indicated on the small lower numeric display. Used during factory calibration, this allows a visual check on the VERSATORQ's internal analog-to-digital (A/D) converter.
 - The display momentarily reads "OI-" (OK) or an error code indicating a bad sensor EEPROM, connector, etc.
 - The display then reads 70% percent of the sensor's rated capacity with MSD blinking.
13. Apply 70% of the sensor's rated capacity in CW torque.
14. Push ENTER key. Display reads between "1500"—"3000" A/D counts during count down. Refer to step 12.
15. Push SET UP key and hold for three seconds.
16. Apply and remove the sensor's full-scale torque three times in the CCW direction.
17. Program calibration code "5333" into the display using the μ increment key and the ψ shift key.
18. Push ENTER key. The small upper display reads "CAL" and the lower display reads "FS".
19. Program full scale value of sensor into the display using the μ increment key and the ψ shift key.
20. Push ENTER key. Display reads "LoAd" and the small upper display reads "CAL."
21. Apply CCW torque to the sensor until the alarm sounds indicating sufficient input exercise.
22. Remove torque weights, leaving the torque arm attached. The display shows alternating "0-00-" and "0-0."

23. Push ZERO TARE key. Display reads -10% of the sensor's rated capacity with MSD blinking. Small lower display reads "-1."
24. Apply 10% of the sensor's rated capacity in CCW torque.
25. Push ENTER key. The display reads between "-0200"—"-0450" during a count down sequence of 9 to 1. Refer to step 12.
 - The display reads "OI-" (OK) or an error code indicative of a bad sensor EEPROM, connector, etc.
 - The display then reads -70% percent of the sensor's rated capacity with MSD blinking.
26. Apply 70% of the sensor's rated capacity in CCW torque.
27. Push ENTER key. Display reads approximately "-1500"—"-3000" A/D counts during count down. Refer to step 12.

VERSATORQ1 Meter Calibration

WARNING

Due to its digital nature, calibration of the Meter is rarely needed. If necessary, calibration must be performed by a qualified laboratory technician using precision grade volt/millivolt measuring equipment. Improper calibration will result in torque measurement errors. Follow these procedures precisely. If you make a mistake, turn the meter off and begin the calibration procedure again. Users are responsible for the results of their meter calibration.

Procedure

1. Install a known good sensor and turn on the meter.
2. Push SET UP key and hold for three seconds.
3. Program calibration code "5111" into the display using the μ increment key and the ψ shift key.
4. Push ENTER key. The small upper display reads "CAL" and the lower display reads "V."
5. Remove the sensor connector and replace it with the calibration fixture. Refer to *Figure 8*.

6. Using a precision digital volt meter, measure the voltage between pins 2 and 5 of the fixture connector.
7. Program this voltage into the display using the μ increment key and the Ψ shift key. Example: "6.058."
8. Push ENTER key.
9. Short circuit pins 3 and 4 of the fixture connector.
 - The display should read about "4000," ± 200 .
 - The small, lower display reads "000."
10. Push ENTER key. The small lower display reads "A".
11. Remove the short circuit from pins 3 and 4.
12. Using a precision digital volt meter, measure the millivolts across pins 3 and 4 (approximately 12.50 mV).
13. Program this voltage into the display by holding down the μ key to increment or the Ψ shift key to decrement the display. Example: "12.50"
14. Push ENTER key.

Calibration Fixture

A calibration fixture must be fabricated to provide access to the VERSATORQ sensor connector during meter calibration. Three resistors are installed onto a DE9P connector. Refer to *Figure 8*.

Equipment Required

- One (1) DE9P connector,
- One (1) 1 ohm resistor,
 - A toggle switch may be added across the 1 ohm resistor to provide a short circuit to pins 3 and 4. For additional information refer to step 9 of *Meter Calibration*, and
- Two (2) 240 ohm resistors.

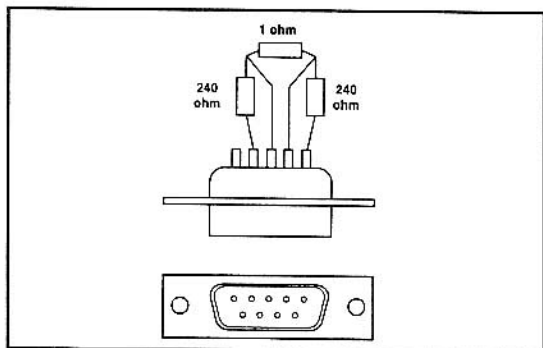


Figure 8: Calibration Fixture

Accessories

The VERSATORQ1 includes the:

- VERSATORQ meter,
- VERSACHARGE1 charger (120 VAC), and
- PB57A carrying case.

Sensors

Sensor Range	Drive	Diam.	Length	Cable	Part No.
2–20 in-oz*	1/4"	0.5"	2.9"	48"	VERSA1S20
1–10 in-lb*	1/4"	0.7"	2.9"	48"	VERSA1S10
5–50 in-lb	1/4"	0.9"	2.1"	48"	VERSA1S50
20–200 in-lb	1/4"	0.9"	2.1"	48"	VERSA1S200
10–100 ft-lb	3/8"	1.2"	2.4"	48"	VERSA2S100
25–250 ft-lb	1/2"	1.4"	2.6"	48"	VERSA3S250
60–600 ft-lb	3/4"	2.0"	3.9"	96"	VERSA4S600
150–1500 ft-lb	1"	2.4"***	4.4"	92"****	VERSA5S1500

* Knurled handle for fingertip control.

** Diameter does not include side mounted connector.

*** Heavy duty coiled cord with 4-pin MS style sensor connector.



Contact your **Snap-on** representative for rotary sensor information.

Battery Chargers

Description	Part No.
120 VAC to 9VDC @ 200 mA	VERSACHARGE1
220 VAC to 9VDC @ 200 mA (EURO)	VERSACHARGE2
220 VAC to 9VDC @200 mA (G.B./Australia)	VERSACHARGE3

Optional Equipment

Description	Part No.
Head Phones	
Dual Headset with 1/8" Stereo Plug ..	VERSAPHONE
Table Stand	
Secures the meter for use on a work bench	VERASTAND
Interface Cable	
RS-232 Serial Printer Cable	VERSACABLE

Notes

Notes

**Snap-on Torque Meters
Limited One (1) Year Warranty**

SNAP-ON TOOLS COMPANY WARRANTS THIS ELECTRONIC TORQUE METER TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR ONE (1) YEAR FROM THE DATE OF PURCHASE BY THE ORIGINAL CONSUMER. **Snap-on** will repair or replace this meter if it fails to give satisfactory service due to defective workmanship or materials. Repair or replacement shall be at the election and expense of **Snap-on** Tools Company. Products must be returned to **Snap-on** or a **Snap-on** dealer for warranty service, unless such return is unreasonable. Proof of purchase date is required to make a warranty claim.

Snap-on does NOT provide any warranty for 1) products labeled other than **Snap-on** 2) consumable products (except as noted below) or 3) products subjected to abnormal use. The warranty for non **Snap-on** products is provided by the manufacturer, which is not **Snap-on**. **Snap-on** will pass on warranties granted by other manufacturers. Consumable products are not covered by any warranty, except for a defect in workmanship or materials in a new product that prevents its use. Consumable products are goods reasonably expected to be used up or damaged during use, including but not limited to drill bits, saw blades, grinding discs, sanding discs, knife blades, files, O₂ sensors and batteries. Abnormal use includes misuse, accident, modification, unreasonable use, neglect, lack of maintenance, use in production-related service, or use after the tool is significantly worn.

SNAP-ON SHALL NOT BE LIABLE FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL COSTS OR DAMAGES INCURRED BY THE PURCHASER OR OTHERS (including without limitation, lost profits, revenues, anticipated sales, business opportunities, goodwill, or interruption of business and any other injury or damage). Some states do not allow the exclusion or limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty is your exclusive remedy and is in place of all other rights and remedies. You may have other rights which vary from state to state or country.

For further information contact:
Snap-on Tools Company
2801-80th Street
Kenosha, WI 53141-1410 U.S.A.

Snap-on Tools Company
Kenosha, WI 53141-1410 U.S.A.

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